

DAIRY MODERNIZATION

By Kathy Barrett

Activity and rumination monitors can lead to better cow health and farm profitability

Using activity monitors for heat detection

The cows on the Dueppengiesser Dairy farm can't make a move without owner Pete Dueppengiesser knowing about it.

That's a bit of an exaggeration, but with the use of activity monitors Dueppengiesser is able to monitor his cows' activities pretty closely.

Dueppengiesser Dairy is one of a few farms that are collaborating with Dr. Julio Giordano, Cornell University, on studies to investigate the use of activity and rumination monitors on dairy farms.

Heat detection is crucial to reproductive efficiency. It takes both time and expertise for cows to be accurately observed in heat. As farms have added cows the task has become more of a challenge. Number of cows in a pen and the number of cows synched at one time makes it hard to tell which cow is in heat at what stage. Cows that reach higher levels of milk production often show weaker signs of heat.

This translates into increased time needed to observe cows by people with even more finely tuned detection skills. People who have these kinds of skills aren't so easy to come by.

These factors can limit the reproductive efficiency of a herd. In fact, heat detection on dairy farms is estimated at less than 50 percent.

Farmers have found ways to manage these limitations by using visual aids and hormone synchronization programs. These methods are effective to increase heat detection and pregnancy rate, yet room for improvement remains. This is where activity monitors may play a role.

Activity monitors use a motion sensor called an accelerometer. The accelerometer measures the cows up and down, back to front, and side to side movements. By contrast a pedometer measures steps alone.

Several companies have developed and are marketing activity monitors. They all have slightly different features and capabilities but the basic concept for all is the same. By measuring a cow's activity, and then looking for changes from the animal's norm, earlier heat detection and health changes can be identified.

The motion sensors are placed in tags that are put on the cow's neck or leg. The cow's movements are recorded at set intervals 24 hours a day. In some systems the data is read when the cows enter the parlor to be milked. In others the data is aggregated and transferred wirelessly every one to two hours throughout the day. This gives the farmer real time data on their cows' behavior.

The activity monitors can be used on heifers and lactating cows. Once placed on the animal, data is collected for four to seven days to develop a baseline of activity for that individual cow. When the animal's behavior deviates from that baseline the cow is flagged.

Increased activity indicates the cow is coming into heat. Used in conjunction with a synchronization program, farmers can make sure that cows are bred in a timely manner after the end of the voluntary waiting period, or after failing to conceive after a previous breeding. This maximizes reproductive

Pete and Mike Dueppengiesser



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performance. In some cases this system may also help reduce the need to synch cows and allow for use of fewer hormones.

The economics

From an economic perspective, activity monitors may benefit dairy farms through reductions in labor costs for heat detection, increased pregnancy rates in cases when heat detection efficiency is low, and the decreased costs of hormones. Even though hormone cost reductions are possible, it is important to note that for most dairy farms some level of synchronization use will be necessary.

Indeed, recent results from research performed with activity monitors at the University of Wisconsin indicate that under some circumstances activity monitors have been as effective as other programs that rely on synchronization of ovulation protocols, but some level of synchronization use is necessary. Even though it is difficult to quantify, another potential benefit of using electronic devices for heat detection is that labor previously used for heat detection can be used more effectively in other activities on the farm.

Activity and rumination monitors for better cow health

Activity monitors have developed a track record for improving heat detection rates. A natural extension of their use is to improve cow health monitoring. The most obvious example is a cow whose activity monitor indicates she is less active because she is just starting to develop a disease. The activity monitor can pick this up before she exhibits clinical signs of disease. By checking the animal out sooner the disease can be treated before it worsens.

The next evolution in individual cow monitoring combines activity monitoring with rumination monitoring. Monitoring rumination is different than activity monitoring, although it is most often done in conjunction with activity monitoring. Rumination monitors use tiny microphones inside a neck tag to collect real time data on rumination.

Farmers have always known that rumination is an indication of the health and well-being of their animals, however, it is a challenge to monitor rumination visually throughout the day. When cows are ruminating, or chewing their cud, it means their digestive systems are working the way they should. For proper rumination they need a high quality ration and adequate time to rest.

Herd size, stocking density and freestall barns don't lend themselves to keep track of how often a particular cow is chewing her cud. A cow ruminates for about eight hours a day when she's feeling good, eating properly and resting often enough.

The onset of metabolic disorders and infectious diseases can be detected by a decrease in rumination before other symptoms are observed. Early detection leads to early intervention which can minimize the impact and duration of a health problem. The rumination monitors don't diagnose disease but they give farmers an early warning system so they can check an animal for diagnosis. □

Research on rumination and activity monitors

By Kathy Barrett

Dr. Julio Giordano, Cornell University, is conducting on farm research with activity and rumination monitors. His focus is to evaluate the use of activity monitors in combination with synchronization of ovulation programs to maximize the use of the technology.



Julio Giordano

Most present and previous research indicates that activity monitors are successful to indicate which cows are in heat and to determine the best time for breeding.

Dr. Giordano is also investigating the use of rumination monitors in conjunction with activity monitors for the identification of cows with health disorders. Methods for earlier and accurate identification of cows with health disorders may have major benefits to cow health, welfare and productivity, while reducing labor time for monitoring cow health. Reduced feed intake and activity are the first warning signs of some metabolic and infectious diseases in dairy cows.

Monitoring rumination (as an indicator of feed intake) and cow activity (as an indicator of behavior) during the pre and post-calving periods could be an invaluable method for earlier identification of sick cows.

Changing the course and/or reducing the severity of disease by applying the necessary interventions or treatments could have very real implications for the overall health, as well as future productive and reproductive performance, of lactating dairy cows.

In this study rumination and activity monitor tags are placed on cows 28 days before freshening. A baseline for each individual cow is determined the first seven days. The cows are then monitored until 30 days in milk.

Giordano is working on determination of the timing of identifying cows with health disorders, including metritis, subclinical and clinical ketosis, displaced abomasum, mastitis, milk fever, and lameness using a combination of rumination data and daily observations by personnel. Preliminary results are promising, suggesting that at least for many of the disorders affecting cows in the early postpartum period, activity and rumination monitoring may be useful technologies for early identification of sick cows. □